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Analyzing Marriage Statistics as Recorded in the *Journal of the American Statistical Association* from 1889 to 2012

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Senior Thesis

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April 25, 2022

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### Abstract

The United States has been tracking American marriage statistics since its founding. According to the United States Census Bureau, “marital status and marital history data help federal agencies understand marriage trends, forecast future needs of programs that have spousal benefits, and measure the effects of policies and programs that focus on the well-being of families, including tax policies and financial assistance programs.”<sup>1</sup> With such a wide scope of applications, it is understandable why marriage statistics are so highly studied and well-documented.

This thesis will analyze American marriage patterns over the past 100 years as documented in the *Journal of the Statistical Association*, noting the changes between overall trends and which variables are analyzed and providing historical context. I will be focusing on three primary areas of interest: childbearing and fertility, women, and race.

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<sup>1</sup> “Why We Ask Questions About... Marital Status / Marital History.” United States Census Bureau. Accessed March 10, 2022. <https://www.census.gov/programs-surveys/acs/>.

## Introduction

According to their website, the American Statistical Association “is the world’s largest community of statisticians... It is the second oldest, continuously operating professional association in the country.” The organization was “founded in Boston in 1839”<sup>2</sup> and “support[s] excellence in the development, application, and dissemination of statistical science through meetings, publications, membership services, education, accreditation, and advocacy.”<sup>2</sup> Since its inception, the American Statistical Association has since increased their size and the scope of their work to over 19,000 members and 16 additional journals.<sup>2</sup>

The *Journal of the American Statistical Association* is their oldest publications. It is exclusively focused on statistical science. The first issue of the *Journal of the American Statistical Association* was published in 1888.<sup>2</sup> The journal represents the areas of interest of the American Statistical Association, and, because the group was the first and largest group of statisticians in the United States, is also somewhat representative of the interests, questions, and methodologies of American statistics.

I will analyze American marriage patterns over the past 100 years as documented in the *Journal of the Statistical Association*, noting the changes between statistical methods, overall trends, which variables are analyzed, and which are left out. I will be focusing on three primary areas of interest in particular: fertility, women, and race.

From the 1900s to the late 2010s, or roughly a 100-year range, *Journal of the American Statistical Association* has published 19 articles with the title including the key

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<sup>2</sup> American Statistical Association. “About ASA.” American Statistical Association. Accessed April 12, 2022. <https://www.amstat.org/about-asa>.

word “marriage.” The study of marriage statistics has been treated broadly in articles such as “The Condition and Needs of Statistics of Marriage and Divorce” (1893), as well as with regional specificity such as “The Marriage Rate in Michigan, 1870-1800” (1894), and for its role in fertility in articles such as “Reproduction Rates Adjusted for Age, Parity, Fecundity, and Marriage” (1946) and the racially-specific “Differential Fertility According to Social Class: A Study of 69,620 Native White Married Women under 45 Years of Age Based upon the United States Census Returns of 1910” (1930).

I will be analyzing these articles for the differences in statistical methods, or how they obtained their data; overall trends, such as an increase or decrease in marriage rates; and noting which variables are analyzed. Pulling from outside readings such as the U.S. Census and historical documents of the times, we will attempt to understand the reasons behind these shifts and discrepancies.

Key Marriage Statistics in the *Journal of the American Statistical Association* Over the  
Past 100 Years

What is the significance of statistics about marriage and why should the United States study them? Marriage statistics describe a phenomenon that has an enormous influence over the United States. Marriage affects people socially, economically, and legally; it “provides structure, such as sexual gratification and regulation, division of labour ... economic production and consumption, and satisfaction of personal needs for affection, status, and companionship.”<sup>3</sup>

At the same time, marriage’s influence on the United States has significantly shifted throughout the past 100 years. Sociologist Andrew J. Cherlin, who has spent many decades analyzing marriage in the United States, “argue[d] that marriage has undergone a process of deinstitutionalization – a weakening of the social norms that define partners’ behavior – over the past few decades.”<sup>4</sup>

In addition to its status as an institution, marriage itself has also changed dramatically over the past century within the United States. Choices such as “childbearing outside of marriage, living with a partner without ever marrying, living apart but having intimate relationships are more acceptable and feasible than ever before,” which has contributed to marriage becoming “less dominant as a social

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<sup>3</sup> Editors of Encyclopaedia Britannica. “Marriage: Definition, History, Types, Customs, Laws, & Facts.” Encyclopædia Britannica. Encyclopædia Britannica. Accessed April 20, 2022. <https://www.britannica.com/topic/marriage>.

<sup>4</sup> Cherlin, Andrew J. “The Deinstitutionalization of American Marriage.” *Journal of Marriage and Family* 66, no. 4 (2004): 848–61. <https://www.jstor.org/stable/3600162>.

institution in the United States than at any time in history.”<sup>5</sup> Statistics regarding “marriage and divorce rates, cohabitation, childbearing, sexual behavior, and women's work outside the home” have changed the meaning of and value placed on marriage as an institution throughout the years.<sup>5</sup> As the legalization of same-sex marriage in all 50 states was only passed in 2015<sup>6</sup>, the *Journal of the American Statistical Association* articles, which span the time period from 1889 through 2012, assume heterosexuality within marriage. Cherlin contended that “the practical importance of marriage has declined,” but “its symbolic significance has remained high and may even have increased. It has become a marker of prestige and personal achievement.”<sup>4</sup>

It is important to note that some of the methodologies employed in the *Journal of the American Statistical Association* in the late 1800s and early 1900s would not be considered reliable by today’s more rigorous standards. The lack of robust data sets was recognized by late nineteenth century contributors. According to author Samuel Warren Dike, the United States’ recording of marriage statistics was greatly lacking in the 1890s. As an American clergyman and activist, Samuel W. Dike was concerned with marriage,<sup>7</sup> particularly as it pertained to divorce and Christianity, publishing several articles on the subject, such as “Divorce Legislation” (1889), “The Theory of the Marriage Tie” (1893), and “Uniform marriage and divorce laws” (1890) for the National Divorce Reform League. He lamented that “in the United States the [marriage] registration reports of only

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<sup>5</sup> Cherlin, Andrew J. “American Marriage in the Early Twenty-First Century.” *The Future of Children* 15, no. 2 (2005): 33–55. <https://www.jstor.org/stable/3556562>.

<sup>6</sup> *Obergefell v. Hodges*, No. 14-556, slip op. at 22–23 (U.S. June 26, 2015).

<sup>7</sup> Dike, Samuel W. 1839-1913 (Samuel Warren) [WorldCat Identities]. <http://worldcat.org/identities/lccn-n85199981/>. Accessed 16 Mar. 2022.



six or eight states are sufficiently full in detail or complete in returns to be entirely trustworthy, and about as many more are approximately complete. Only twenty-one states in 1886... provided for any returns of marriage and, as the report of [the Commissioner of Labor of the United States] says, ‘These returns, as a rule, however, give but a few facts relative to the persons married, and these facts that are given are not identical, are compiled so carelessly as to be nearly worthless... This report shows conclusively the necessity of complete records of marriages celebrated’”<sup>8</sup> The statistics, Dike noted, did not gather religious affiliation, the couples’ “economic condition or other facts of social standing.”<sup>8</sup>

Although Dike’s comments that the country’s methods of recording marriage statistics did not seem reliable, it is interesting to note that Dike lacked academic legitimacy in some ways as well. The biases of researchers, then and now, informed the choice of questions and how responses were analyzed. For example, Dike was a Congregational minister associated with a church and the National Divorce Reform League, a “conservative religious [man who] advocated strict divorce laws and supported conservative social causes.”<sup>9</sup> As such, Dike was biased against divorce; for example, Dike referenced divorce as an “evil.”<sup>8</sup>

Modern statistical standards are more rigorous. For example, the American Statistical Association, in their “Ethical Guidelines for Statistical Practice,” states that the

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<sup>8</sup> Dike, Samuel W. “The Condition and Needs of Statistics of Marriage and Divorce.” *Publications of the American Statistical Association* 3, no. 24 (1893): 513–18. <https://doi.org/10.2307/2276355>.

<sup>9</sup> Akard, Cynthia. “The National Divorce Reform League’s Influence on Divorce Legislation in the Late Nineteenth Century,” 1997. <https://repository.library.georgetown.edu/handle/10822/1051095>.

“ethical statistical practitioner: ... Discloses conflicts of interest, financial and otherwise, and manages or resolves them according to established policies, regulations, and laws.”<sup>10</sup>

Dike did not disclose his biases towards publishing research suggesting the negative effects of divorce and promoting traditional Christian marriage. Many of the older articles are also not “transparent about assumptions made in the execution and interpretation of statistical practices, including methods used, limitations, possible sources of error, and algorithmic biases.”<sup>10</sup> For example, in “Birth, Death and Marriage Rates of Large German Cities in 1931” (1932), author Edwin W. Kopf included tables from the *Reichsgesundheitsamt*, Germany’s Federal Health Agency<sup>11</sup> but did not “[communicate] data sources and fitness for use, including data generation and collection processes and known biases” and “[communicate] data processing and transformation procedures, including missing data handling.”<sup>10</sup>

Comparatively, statistician Michael E. Sobel’s 2012 article “Does Marriage Boost Men’s Wages?: Identification of Treatment Effects in Fixed Effects Regression Models for Panel Data” covered his mathematical methods in detail. Particularly in the “Discussion” section at the end, Sobel explained his decision-making process behind the chosen statistical methods.<sup>12</sup>

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<sup>10</sup> American Statistical Association. “Ethical Guidelines for Statistical Practice.” American Statistical Association, 2022. <https://www.amstat.org/your-career/ethical-guidelines-for-statistical-practice>.

<sup>11</sup> Kopf, Edwin W. “Birth, Death and Marriage Rates of Large German Cities in 1931.” *Journal of the American Statistical Association* 27, no. 178 (1932): 192–192. <http://www.jstor.org/stable/2277669>.

<sup>12</sup> Sobel, Michael E. “Does Marriage Boost Men’s Wages?: Identification of Treatment Effects in Fixed Effects Regression Models for Panel Data.” *Journal of the American Statistical Association* 107, no. 498 (June 1, 2012): 521–29. <https://doi.org/10.1080/01621459.2011.646917>.

As a result of the compromised data of the earlier journal articles and lack of background information on several of the authors, I will focus on analyzing the questions asked over the years and what statistics were analyzed, rather than comparing results. What the American Statistical Association chose to study reveals information about the country's values at the time of publication.

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## Marriage and Families

A recurring theme in the articles was that of children. This makes sense; marriage can dictate family structure and a child's upbringing. As such, one of the "strongest function[s]" of marriage "concerns procreation, the care of children and their education and socialization, and regulation of lines of descent."<sup>3</sup>

Before I began reading through the articles, I hypothesized that the number of articles studying children in a marriage article would drop off somewhere towards the second half of the 1900s, coinciding with the drop off in birth rates after the baby boom, which ended in 1964.<sup>13</sup> The end of the baby boom signified not only the end of an era of above-average birth, but also the beginning of a sharp decline in fertility rate overall. The fertility rate dropped to 1.78 in 2020, as opposed to 3.58 in 1960.<sup>14</sup> If people were having less children, they may have been less interested in studying them in relation to marriage as well.

Although childbearing took a dive numbers-wise, referencing the article titles revealed that children remained a topic of interest for the American Statistical Association into the 2010s. Six out of nineteen, or roughly one third, of the articles I am studying mention "birth," "reproduction," and "fertility" in their titles. I will not, then, claim that the focus has shifted to a place where marriage and children are no longer interconnected. However, there is a marked shift to include more couple-centric topics

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<sup>13</sup> Editors of Encyclopaedia Britannica. "Baby Boom." Editors of Encyclopaedia Britannica. Editors of Encyclopaedia Britannica. Accessed April 21, 2022. <https://www.britannica.com/topic/baby-boom-US-history>.

<sup>14</sup> UN DESA, und Gapminder. "Total fertility rate in the United States from 1800 to 2020." Chart. June 17, 2019. Statista. Accessed April 21, 2022. <https://www.statista.com/statistics/1033027/fertility-rate-us-1800-2020>

that aren't just the marriage rate or children-related statistics. This is demonstrated in articles in the *Journal of the American Statistical Association*.

Earlier articles include "Marriages of the Deaf in America," written in 1899 by Edward Allen Fay, an important figure in deaf education as the third professor at Gallaudet College, a dedicated to the "intellectual and professional advancement of deaf and hard of hearing individuals."<sup>15</sup> Fay was also an editor of the academic journal *American Annals of the Deaf*.<sup>16</sup> His article for the *Journal of the American Statistical Association* is considered one of his "two seminal publications of great historical significance."<sup>16</sup> In the article, Fay compiled a list of four questions that he considered to be relevant to deaf marriage:

1. Are marriages of deaf persons more liable to result in deaf offspring than ordinary marriages?
2. Are marriages in which both partners are deaf more liable to result in deaf offspring than marriages in which one of the parents is deaf and the other is a hearing person?
3. Are certain classes of the deaf, however they may marry, liable than others to have deaf children? If so, how are these c respectively compared, and what are the conditions that increase or decrease this liability?

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<sup>15</sup> Gallaudet University. "About." Accessed April 25, 2022.  
<https://www.gallaudet.edu/about>.

<sup>16</sup> "Historical Sign Language Database." Sign Language Research Lab at Georgetown University. Accessed April 22, 2022.  
<http://hslldb.georgetown.edu/films/film-bio.php?source=fay>.

4. Aside from the question of the liability of the offspring to ness, are marriages in which both partners are deaf more likely result happily than marriages in which one partner is deaf and the other is a hearing person?<sup>17</sup>

Three out of the four primary marriage questions Fay asked had to do with children, with only the fourth focusing on the couple themselves. This trend carried over into the data he collected. In his analysis, Fay provided statistics for seven categories. Five of the categories,

1. Productiveness: number of children
2. Deaf offspring: one or more partners deaf
3. Partners having deaf relatives
4. Consanguineous partners' offspring deafness
5. Both partners deaf or one hearing's offspring deafness

were focused on the couple's children, while only two of the categories, percentage of deaf and hearing partnerships and the couples' happiness, emphasized the couples themselves.

While Fay's article considered children an automatic product of marriage, later articles separated the idea of marriage and children in their studies, such as Hugh Carter's 1953 article "Improving National Marriage and Divorce Statistics." The article was written on behalf of the National Office of Vital Statistics, which today, according to their website, "provides the most complete data on births and deaths in the United

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17. Fay, Edward Allen. "Review of Marriages of the Deaf in America." *Publications of the American Statistical Association*, vol. 6, no. 47, 1899, pp. 353–56. *JSTOR*, <https://doi.org/10.2307/2276467>.

States.”<sup>18</sup> Carter stated that the “rate of formation of new families,” or the marriage rate, “is of interest to sociologists, economists, demographers, social workers, and many other professional and business groups. Statisticians concerned with population projections have recently shown an increased interest in the role of marriage data as an aid in forecasting births.”<sup>19</sup>

Ronald Demos Lee’s 1975 article “Natural Fertility, Population Cycles and the Spectral Analysis of Births and Marriages” also separated marriage and children. In this article, Lee sought to challenge the preindustrial European idea that “marital fertility was relatively constant at ‘natural’ levels and not subject to voluntary control,” and “[y]ear-to-year changes in number of births were due to changes in the age and frequency of marriage (nuptiality)”<sup>20</sup>. He used time series of births and marriages to test four hypotheses:

Hypothesis A, the strong natural fertility hypothesis, asserts that marital fertility is constant and all variation in the birth and marriage series originates in fluctuating nuptiality. Hypothesis B asserts the opposite, namely, that nuptiality is constant and all variation is due to marital fertility. Hypothesis C, the weak natural fertility hypothesis, asserts that nuptiality and marital fertility both vary but do so independently, presumably under the influence of different disturbing forces.

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<sup>18</sup> “NVSS - National Vital Statistics System Homepage.” Centers for Disease Control and Prevention, March 21, 2022. <https://www.cdc.gov/nchs/nvss/index.htm>.

<sup>19</sup> Carter, Hugh. “Improving National Marriage and Divorce Statistics.” *Journal of the American Statistical Association* 48, no. 263 (1953): 453–61. <https://doi.org/10.2307/2281001>.

<sup>20</sup> Lee, Ronald Demos. “Natural Fertility, Population Cycles and the Spectral Analysis of Births and Marriages.” *Journal of the American Statistical Association* 70, no. 350 (June 1975): 295–304. <https://doi.org/10.1080/01621459.1975.10479862>.

While nuptiality is controlled voluntarily, marital fertility might, for example, be influenced by involuntary fecundity impairment. Finally, according to Hypothesis D, variations in nuptiality and marital fertility are highly correlated, presumably in response to the same social and economic changes. This suggests voluntary control of fertility within marriage, although other interpretations are possible.<sup>20</sup>

Lee not only questioned the preindustrial European idea that birthrate and marriage were natural and completely tied but outright stated that he “reject[ed] the ‘natural fertility’ hypothesis and conclude[d] that nuptiality and marital fertility were equally variable and very highly correlated.”<sup>20</sup> By making nuptiality, or the marriage rate, and marital fertility separate variables, he indicated a shift in thinking away from a steady number of children being naturally guaranteed in or (always) intrinsic to marriage.

Lee worked on a similar article, “Joint Forecasts of U.S. Marital Fertility, Nuptiality, Births, and Marriages Using Time Series Models,” alongside Lawrence R. Carter, which was published eleven years later in 1986. He studied the same phenomenon using a slightly different mathematical method.<sup>21</sup>

Lee’s articles coincided with the rise in birth control availability and use in the United States. In a 1999 copy of the “Morbidity and Mortality Weekly Report,” the Centers for Disease Control and Prevention (CDC) pointed to 1960 as when “the era of modern contraception began” because that was “when both the birth control pill and

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<sup>21</sup> Carter, Lawrence R., and Ronald D. Lee. “Joint Forecasts of U.S. Marital Fertility, Nuptiality, Births, and Marriages Using Time Series Models.” *Journal of the American Statistical Association* 81, no. 396 (December 1986): 902–11. <https://doi.org/10.1080/01621459.1986.10478348>.



intrauterine device (IUD) became available.”<sup>22</sup> Women using birth control meant family planning and lined up with the decrease in general births.

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<sup>22</sup> Morbidity and Mortality Weekly Report. “Achievements in Public Health, 1900-1999: Family Planning.” Centers for Disease Control and Prevention. Accessed April 22, 2022. <https://www.cdc.gov/mmwr/preview/mmwrhtml/mm4847a1.htm>.

### Gender/Sex Analysis

The way that women were discussed in older articles differs greatly to more recent ones. Two modern articles, “Modeling American Marriage Patterns” (1990), which modeled the age distribution of women at first marriage, and “Does Marriage Boost Men's Wages?” (2012), which compared wages of married versus unmarried men, were couple-focused as opposed to child-focused.

In David E. Bloom and Neil G. Bennett’s 1990 article “Modeling American Marriage Patterns” in the *Journal of the American Statistical Association*, they explained that there were reasons for this. “Since the early 1970s, the rate of first marriages experienced by women aged 14 and over has declined substantially in the United States.”<sup>23</sup> This is shown to be the case for “men as well, [and] has been quite steady over time and goes hand in hand with the increasing proportion of young adults who are single in the population.”<sup>23</sup> They explained that one of the theories is that the shift in marriage is due to timing and not marriage itself.

According to some researchers, this trend reflects changes in the timing of marriage... For example, according to Cherlin (1981, p. 11), “The higher proportion of single young adults in the 1970s and the early 1980s suggests only that they are marrying later, not foregoing marriage. It is unlikely that their lifetime proportions marrying will fall below the historical minimum of 90 percent.” Cherlin is joined in this speculation by the U.S. Bureau of the Census

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<sup>23</sup> Bloom, David E., and Neil G. Bennett. “Modeling American Marriage Patterns.” *Journal of the American Statistical Association* 85, no. 412 (December 1990): 1009–17. <https://doi.org/10.1080/01621459.1990.10474971>.

(see, e.g., Norton and Moorman 1987), Glick (1984), Blau and Ferber (1986), and Bianchi and Spain (1986)...<sup>23</sup>

However, even if it was just the marriage age that was changing and not the overall rate of marriages, later marriage has lasting effects on the “rate of population growth and ... customs of general social importance.”<sup>24</sup>

Other researchers disagreed and suggested that the “recent trends are potentially reflective of major changes in the incidence of marriage, since the rising economic status of women leaves them with less incentive to enter traditional marriages.”<sup>23</sup> Evidence for this include that the “secular increase in the median age at first marriage is consistent with a decline in the proportion of individuals who ever marry, and not only with the phenomenon of delayed marriage.”<sup>23</sup>

The “economic status of women” has changed greatly over the past one hundred years. In 1930 the *Journal of the American Statistical Association* published Edgar Sydenstricker and Frank W. Notestein’s article “Differential Fertility According to Social Class: A Study of 69,620 Native White Married Women under 45 Years of Age Based upon the United States.” In the article, women were categorized into social classes, “(1) Professional, (2) Business, (3) Skilled Workers, and 4) Unskilled Laborers” and “(1) Farm Owners, (2) Farm Renters, and (3) Farm Laborers.”<sup>25</sup> Something interesting to

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<sup>24</sup> Taylor, Paul S. “Note on Age at Time of Marriage in Two Mexican Localities of Divergent Types.” *Journal of the American Statistical Association* 27, no. 180 (1932): 427–30. <https://doi.org/10.2307/2278642>.

<sup>25</sup> Sydenstricker, Edgar, and Frank W. Notestein. “Differential Fertility According to Social Class: A Study of 69,620 Native White Married Women Under 45 Years of Age Based upon the United States Census Returns of 1910.” *Journal of the American Statistical Association* 25, no. 169 (March 1930): 9. <https://doi.org/10.2307/2278490>.

note: the social classes were purely based off of her husband's employment, not her own. Women were defaulted to the role of housewife. Today, "women's participation in the labor market has nearly doubled, from 34% of working age women (age 16 and older) in the labor force in 1950 to almost 57% in 2016. When it passed 50% in 1978, working women became the norm."<sup>26</sup> In 2020, women comprised 47% of the United States labor force.<sup>27</sup>

With new opportunities, many women are presenting with new choices for when, to whom, and how they want to set up their marriage. Updated couple dynamics have not yet been studied extensively in the *Journal of the American Statistical Association*. Studying what women choose for their marriage when they can make the choice gives insight into women's minds as well as society's changing values.

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<sup>26</sup> Weinstein, Amanda. "When More Women Join the Workforce, Wages Rise — Including for Men." *Harvard Business Review*, January 31, 2018. <https://hbr.org/2018/01/when-more-women-join-the-workforce-wages-rise-including-for-men>.

<sup>27</sup> United States Department of Labor. "Civilian Labor Force by Sex." United States Department of Labor. Accessed April 25, 2022. <https://www.dol.gov/agencies/wb/data/lfp/civilianlfbyssex>.

## Racial Analysis

Fourteen of the nineteen articles were published prior to 1964, when the Civil Rights Act was signed. The Emancipation Proclamation was signed in 1863, a mere twenty-six years prior to the first marriage article published in the *Journal of the American Statistical Association*. Immigration was restricted to certain people as well, including the Chinese Exclusion Act of 1882, Alien Contract Labor laws of 1885 and 1887, and general Immigration Act of 1882.<sup>28</sup> Consequently, a large majority of the articles in the *Journal of the American Statistical Association* were prone to great racial biases.

I will return to Edgar Sydenstricker and Frank W. Notestein's article "Differential Fertility According to Social Class: A Study of 69,620 Native White Married Women under 45 Years of Age Based upon the United States." As per the title, Sydenstricker and Notestein decided only to study "native white" women. In 1930, race was narrowly defined without much room for nuance. Importantly, a "person with both White and Black lineage was to be recorded as Black, no matter fraction of that lineage. A person of mixed Black and American Indian lineage was also to be recorded as Black, unless he was considered to be 'predominantly' American Indian and accepted as such within the community."<sup>29</sup> This mindset was present in Sydenstricker and Notestein's work, where

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<sup>28</sup> United States Citizenship and Immigration Services. "Early American Immigration Policies." United States Citizenship and Immigration Services, July 30, 2020. <https://www.uscis.gov/about-us/our-history/overview-of-ins-history/early-american-immigration-policies>.

<sup>29</sup> "1930 - History." United States Census Bureau. Accessed April 22, 2022. [https://www.census.gov/history/www/through\\_the\\_decades/index\\_of\\_questions/1930\\_1.html](https://www.census.gov/history/www/through_the_decades/index_of_questions/1930_1.html).

“the data selected were limited to those for wives in families in which both husband and wife were native white of native parents and were only once married.”<sup>25</sup> The reasoning behind this was that they were seeking to “obtain an adequate and relatively homogeneous sample of each of certain social classes.”<sup>25</sup>

In 1930, according to the census, the total population was 122,775,046. Approximately 89.8 percent of the population, or 110,286,740 people, were white, only 9.7 percent of the population, 11,891,143 people, were Black, 0.2 percent of the population, 264,766 people, were Asian and Pacific Islander. Under the “Other Race” and “Hispanic origin (of any race), X and (NA) were listed.<sup>30</sup>

The country’s demographics have shifted a bit since then; today, “white alone” makes up only 76.3 percent of the population, “Black or African American alone” has grown to 13.4 percent, Asians comprise 5.9 percent of the population, and Native Hawaiian and Other Pacific Islanders are at 0.2 percent.<sup>31</sup> Terminology has shifted to be “white alone” rather than “native white.”

The article summarized its findings of “the differential fertility of 69,620 wives who have passed through the same proportion of their reproductive period.”<sup>25</sup> Although the article only studied “white native women,” the findings were worded in such a way that it implied it was relevant to all women and all people of certain classes (professional, business, skilled workers, unskilled laborers).<sup>25</sup>

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<sup>30</sup> Gibson, Campbell, and Kay Jung. “Historical Census Statistics on Population Totals By Race, 1790 to 1990, and By Hispanic Origin, 1970 to 1990, For The United States, Regions, Divisions, and States.” *United States Census Bureau*, 2002.

<sup>31</sup> “U.S. Census Bureau QuickFacts: United States.” United States Census Bureau. Accessed April 22, 2022. <https://www.census.gov/quickfacts/fact/table/US/PST045221>.

Sydenstricker and Notestein did not cite their reason for only studying “native white women.” Was it this supposed to have been representative of the general population of women? Without a note on their decision to only study white women other than “obtain[ing] an adequate and relatively homogeneous sample,” it is difficult to know whether they thought the study was representative of the United States female population. More likely, they were only concerned with this segment of the population. Sydenstricker and Notestein stated that they wanted to conduct “[f]urther study of the data” but did not mention studying women outside of “native white” in the future.<sup>25</sup>

While the percentage of minorities has increased significantly, whiteness is still the majority in the United States. Today, the American Statistical Association expects an “ethical statistical practitioner” to “[promote] the dignity and fair treatment of all people. Neither [engage] in nor [condone] discrimination based on personal characteristics” and to “[avoid] statistical practices that ... create or perpetuate discrimination or unjust outcomes. [Consider] both scientific validity and impact on societal and human well-being that results from the organization’s statistical practice.”<sup>10</sup> Sydenstricker and Notestein were operating under the values of 1930s America. They did not necessarily “[engage] in” or “[condone] discrimination,” but by omitting other races, including a note at the end explaining their reasoning, they demonstrated the general disregard for studies about or including minorities in American statistics canon.

Demographer P.K. Whelpton’s article “Reproduction Rates Adjusted for Age, Parity, Fecundity, and Marriage” (1946) revealed more about this, stating that “[n]et reproduction rates for native white women in the United States have been computed for each year from 1920 to 1944 from age, age-parity, and age-parity-fecundity-marriage

specific birth rates.”<sup>32</sup> Differing from Sydenstricker and Notestein, however, Whelpton did reference other races:

Conventionally, the average annual numbers of live births to white (or colored) women during the base period are classified by 5-year age groups (15-19, 20-24, etc.) of mother as of time of birth, corrected for under registration, and divided by the numbers of white (or colored) women in the corresponding age groups at the middle of the base period. It is assumed that a hypothetical cohort of white (or colored) women living through the childbearing period will have (1) at ages 15 through 19 five times the average annual birth rate which white (or colored) women aged 15-19 had in the base period, (2) at ages 20 through 24 five times the average annual birth rate which white (or colored) women aged 20-24 had in the base period, etc. The total number of births to the hypothetical cohort is computed, and multiplied by the percentage of infants that are girls to obtain the number of female births.<sup>32</sup>

“Colored” was placed in parenthesis next to “white.” This raises the question whether these assumptions were being made because the conclusions were based on data focused on white women. There did not appear to be a noted difference between the groups. At the time, the country lacked a lot of race-based information, including “adequate information as to the number of first marriages by color ... of bride.”<sup>32</sup>

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<sup>32</sup> Whelpton, P. K. “Reproduction Rates Adjusted for Age, Parity, Fecundity, and Marriage.” *Journal of the American Statistical Association* 41, no. 236 (1946): 501–16. <https://doi.org/10.2307/2280571>.



This led me to question how many of the earlier articles only took samples of white women and men. Most of the articles did not state race in their findings, but considering the time periods, it appears likely, especially as race was considered a biological confounding factor for many in academia. Eugenics was considered a science during the time of writing of earlier articles.<sup>33</sup> The way race is treated in academia will continue to evolve and change as the years pass. With the revival of anti-racism<sup>34</sup>, I hypothesize that there will be new, better ways of studying and discussing race within statistics soon.

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<sup>33</sup> History.com Editors. "Eugenics." HISTORY, 2019.  
<https://www.history.com/topics/germany/eugenics>.

<sup>34</sup> Ladhani, Sheliza, and Kathleen C. Sitter. "The Revival of Anti-Racism." *Critical Social Work* 21, no. 1 (April 2, 2020): 54–65.  
<https://doi.org/10.22329/csw.v21i1.6227>.

## Conclusion

Marriage is an old and influential institution within the United States. Although I believed I had a grasp on its weight, this study taught me more about how it has changed in the United States and mathematical world. Studying marriage reveals the country's climate around children, gender, and race. Statistics will continue to change as the age of first marriage becomes older, couples have less children, and studies take more diverse samples.

Throughout this process, I have gained a great appreciation for how far statistics has come since the nineteenth century. The nineteen-article sample I took from the *Journal of the American Statistical Association* was not representative of the entire body of statistical work done throughout the past one hundred years. However, studying the articles in comparison to each other provided insight into the political, social, and economic climate of the country at a given time. If given more time, I would be interested to study marriage-related articles from the past one hundred years in another old statistics journal and compare trends there against that of the *Journal of the American Statistical Association*.

## Appendix

- 1889: On Collection of Marriage and Divorce Statistics
- 1893: The Condition and Needs of Statistics of Marriage and Divorce
- 1894: The Marriage Rate in Michigan, 1870-1800
- 1895: The Marriage Rate in Massachusetts
- 1899: Marriages of the Deaf
- 1907: The Methods Employed in Maine in Checking the Returns of Births, Marriages, and Deaths
- 1914: The Influence of Marriage on the Death-Rate of Men and Women
- 1918: Occupational Propinquity as a Factor in Marriage Selection
- 1930: Differential Fertility According to Social Class: A Study of 69,620 Native White Married Women under 45 Years of Age Based upon the United States Census Returns of 1910
- 1932: Birth, Death and Marriage Rates of Large German Cities in 1931
- 1932: Note on Age at Time of Marriage in Two Mexican Localities of Divergent Types
- 1932: Variation in the Duration of Marriages Which End in Divorce, with Special Reference to the State of Wisconsin
- 1946: Reproduction Rates Adjusted for Age, Parity, Fecundity, and Marriage
- 1953: Improving National Marriage and Divorce Statistics
- 1972: The Distribution by Age of the Frequency of First Marriage in a Female Cohort

- 1975: Natural Fertility, Population Cycles and the Spectral Analysis of Births and Marriages
- 1986: Joint Forecasts of U.S. Marital Fertility, Nuptiality, Births, and Marriages Using Time Series Models
- 1990: Modeling American Marriage Patterns
- 2012: Does Marriage Boost Men's Wages?: Identification of Treatment Effects in Fixed Effects Regression Models for Panel Data